

ANTHEMOESSA ABRUPTA.

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Carlinville, Illinois.

On the habits, parasites and inquilines see Frison (1). Some local observations are added here.

Phenology.—Flies 84 days, My 7 — Jl 29, ♂ 51 days, My 7— Jn 26, ♀ 81 days, My 10 — Jl 29. The male beigns 3 days, and ends 33 days, before the female; 7.4 less and 15.2 more than the average of the "5 other long-tongued bees," and 5.9 less and 12.9 more than the general average in 14.

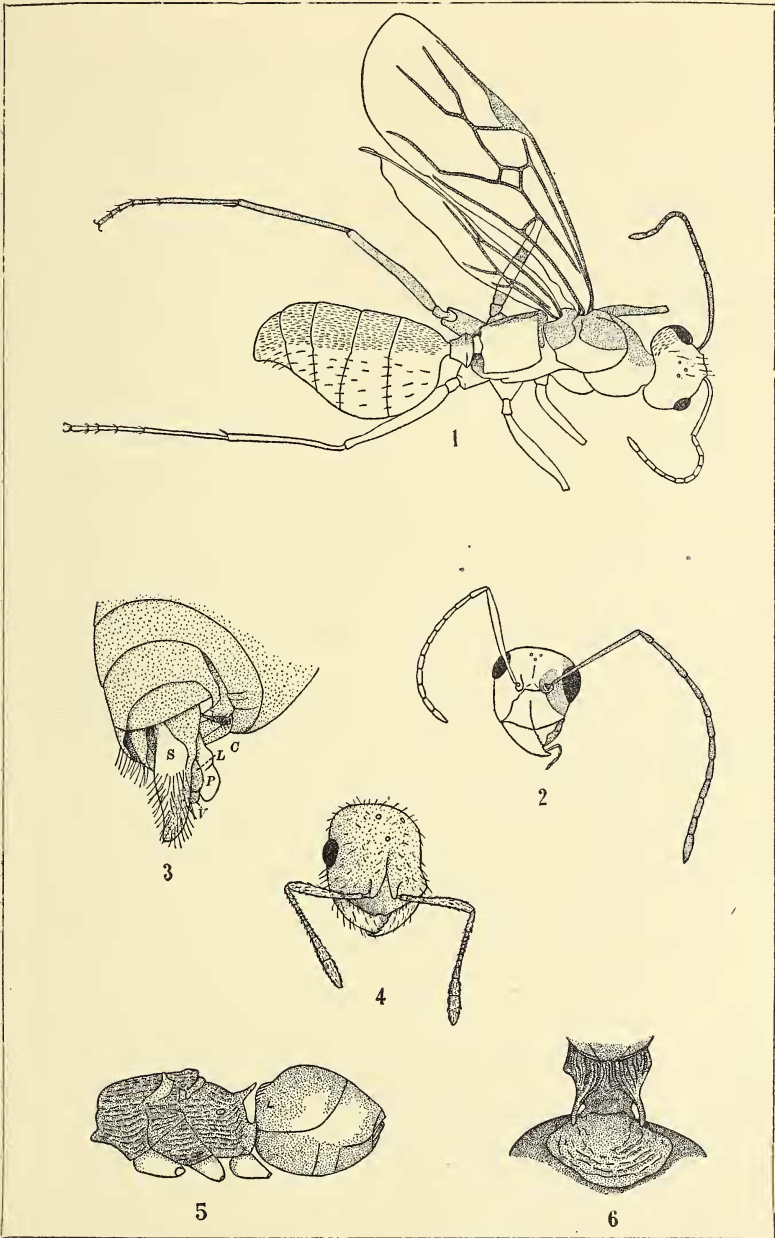
Anthophora ursina begins 29 days earlier, *Clisodon terminalis* begins 18 days later and *Amegilla walshii* 60 days later. Phenologically at their most active time these are rather non-competitive.

At St Louis Rau (4) noted this bee from My 28 to Jl 21, 55 days, 29 less than the local flight. In about 33 years of local field work, Jl 1884—My 1916, I found the male visiting 26 species of flowers. The fact that the flight of the male never ranged over 51 days seems to show that the weather has little to do with it.

Comparison with Melitoma.—Rau says that when the life cycle of this bee had run its course, *Entechnia taurea* made its appearance. At Carlinville *Melitoma* appears 48 days later and ends 70 days later, but it overlaps with *A. abrupta* for 33.9% of its flight. It flies 106 days, ♂95, Jn 24 — S 26, ♀ 103, Jn 27 — O 7. At St Louis Rau gives 94 days, ♂44, Jl 31 — S 12, ♀ 94, Jl 16 — O 17, the female beginning 19 days later and ending 10 days later than at Carlinville.

Rau says: "The males of this species do not seem to emerge before the females; or at least they do not die earlier." At Carlinville the male begins 3 days, and ends 11 days, earlier than the female, 7.4 and 14.8 less than the average of the "5 other long-tongued bees" and 5.9 and 17.1 less than the general average in 14.

Generic selection.—The 5 local Anthophoridæ form a good example. *Anthophora ursina* is probably related to *A. pilipes*



CREIGHTON—ABNORMAL ANTS.

of Europe, *Anthemoessa abrupta* to *A. bomboides*, *Clisodon terminalis* to *Anthophora furcata* of Europe, if not the same, *Ame-gilla walshii* to the south-western *A. smithii*, and *Emphoropsis floridana* to southern and western species. These are the most heterogeneous. Geographically they avoid competition with 95.58% of the species mentioned in 3.

Heterotropy.—Some writers have attributed what they call "oligotrophy," meaning few or exclusive visits, to limited tongue length and synchronism. The male, with a shorter tongue and a flight shorter by 30 days, they would expect to be more limited than the female. There are fewer flowers in the 51 days of the male than in the 81 days of the female. But the male occurs on 26 flowers and the female on 17. The female is alone 33 days, Jn 27 - Jl 29. . Of 250 native July flowers, 99, 39.6%, begin to bloom, so that the female might be expected on a good many flowers on which the male does not occur. But only 5 flowers are visited by the female alone, while 14 are visited by the male alone. The experimental augurs, who assume the simplicity of reactions, may undertake to account for this.

Flower visits (31).—♀ collecting pollen (6)—**Ebenaceae** *Diospyros virginiana*; **Libiatae**: *Scutellaria versicolor*; **Liliaceae** *Polygonatum commutatum*; **Rosaceae**; *Rosa humilis*, *setigera*; **Scrophulariaceae**: *Penstemon lævigatus*.

♀ s. (11).—*Asclepias purpurascens*; *Convolvulus sepium*; *Dianthera americana*; *Frasera carolinensis*; *Glechoma hederacea*. *Monarda bradburiana*, *Teucrium canadense*; *Hydrophyllum virginicum*; *Mertensia virginica*; *Rubus villosus*; *Trifolium pratense*.

♂ s. (26:14).—*With female*: *A. pur.*; *D. amer.*; *D. vir.*; *F. car.*; *G. hed.*, *M. brad.*, *S. ver.*; *H. vir.*; *M. vir.*; *P. læv.*; *P. com.*; *T. prat.* *Alone*: *Aesculus hippocastanum*; *Asclepias syriaca*; *Blephilia ciliata*, *Leonurus cardiaca*, *Stachys palustris*; *Cornus amomum*; *Delphinium tricornis*; *Gillenia stipulacea*; *Iris hexagona*; *Melilotus alba*, *Trifolium repens*; *Pastinaca sativa*; *Penstemon pubescens*; *Triosteum perfoliatum*.

Oligotrophy.—This bee is an oligotrope of Hb and Ma. It shows 80.6% under Hb, 64.5 under Ma and 54.8 under red. Of the female pollen visits all are under Ma and 50% under red. Of the female nectar visits, 54.5 are under Ma and 63.6 under

red. The total female visits show 70.5 under Ma and 58.8 under red. The male visits show 65.3 under Ma and 53.8 under red. The total visits show 22.5% under Labiatae. The bee visits flowers of 17 families.

Literature.—My lists show the sexes and whether the females were collecting the pollen or not. Knuth (2) notes the pollen collecting but ignores the other data. It is not clear why those using these data think the distinction is unimportant. They evidently do not approve of making them. I found the female on 17 flowers and the male on 26. The female was observed collecting pollen on 6 flowers and sucking on 11. The male was taken on 12 flowers also visited by the female and on 14 flowers on which the female was not observed. The bunglers reduce all of these to collectors notes. Even as such the distinction is important. The 12 flowers on which both sexes were taken are the best places for the collectors to look for both. Both sexes are flying only in 57.1 per cent of the time of the species. The surest place to find the female, however, is on *Rosa humilis* and *setigera*, where the male does not occur. Of the 31 visits, 5 were made by the female alone, 12 by both sexes and 14 by the male alone.

Knuth mentions 16 of the above. Lutz and Cockerell (3) mention 9, of which 2 were not in Knuth's list, so that their list ought to give 18. The cryptic bibliography of these authors is well adapted to cover up the literature. They say "Doubtless some of the papers dealing with flowers and bees have been overlooked." The first of my Botanical Gazette papers cited by them is "Robertson 1895, Botanical Gazette XX." That is Flowers and insects XIV, concealing the fact that I-XIII were overlooked. Of the first 19 papers, they cite only 4. On *Anthemoessa abrupta* they overlook one-half the cases¹.

¹In the case of *Emphor bombiformis*, under "Knab, 1911, p. 71, 'Drinking' habits," they say: "See Robertson 1918", as if it were second-hand. Frison evidently thought so and ignored it. What "Robertson, 1918" shows is that Knab's paper was second-hand by 21 years and erroneous in every particular. It shows also that, as regards drinking habits and relations to *Hibiscus*, Grossbeck's and Nichols' observations were second-hand by 21 and 23 years.

Under *Bombus americanorum* and *B. fervidus* Lutz and Cockerell cite Coville 1890 on the "elatus" question and say "see also Robertson 1890" as if the latter were second-hand, in spite of the fact that it is cited by Coville himself and anticipates his paper in almost every particular.

Frison says: "Robertson (1891, 1894, and 1896), in Illinois, records males and females of etc." Here "Illinois" means "Carlinville." Only 3 of the flowers mentioned showed both sexes. Frison follows Lutz and Cockerell in overlooking most of the Botanical Gazette papers and "Labiatae" as well as Knuth's work.

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²Bull. A. M.= Bulletin American Museum Natural History; Fls.= Flowers and insects; St. L. A.= Trans. St. Louis Academy of Science.